

DETAILED ACTION

Status of Application

1. Claims 12 – 32 are pending and presented for the examination. Claims 1 – 11 have been canceled.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) was submitted on February 28, 2006. This submission is in compliance with the provisions of 37 CFR 1.97. The PCT International Search Report listed under Non-Patent Literature Documents is not a proper document for an IDS and therefore, it is not being considered. Accordingly, the information disclosure statement is being considered by the examiner. Please refer to applicant's copy of form PTO-1449 submitted herewith.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 12 and 28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. The term "high temperature" in claims 12 and 28 is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 28 – 32 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over GB 866,082.^[el1]

In regards to claims 28 – 32, p. 1 line 89 to p. 2 line 37 of GB 866,082 disclose a

Art Unit: 4116

solid solution alloy of a solvent metal of the group consisting of silver, nickel, copper, and palladium, and solute metals of the group consisting of aluminum, beryllium, and magnesium in an amount varying from 0.1% to 5% by weight (which is equivalent to 0.4 – 17.4 at% Al and 0.4 – 19 at% Mg which overlap with the ranges recited in claims 31 and 32). It is well known in the art that aluminum, beryllium, and magnesium are all soluble in silver and capable of forming a stable oxide at high temperature. The example cited in p. 2 lines 16 – 37 teaches a silver-based alloy with 99.7 wt% Ag (98.7 at% Ag) and 0.3 wt% Mg (1.3 at% Mg). Therefore, the silver-based alloy does not contain any nickel. Additionally, GB 866,082 teaches that the silver-based alloy is hardened through internal oxidation. Although GB 866,082 does not specify the grain size of the silver-based alloy after hardening, it would have been inherent that it has a final grain size of less than 20 μm because the silver-based alloy is treated as recited in claim 28.

10. Claims 12 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 866,082 in view of Kuroishi et al. (JP 58-016039).

In regards to claims 12, 13, 22, and 23, p. 1 line 89 to p. 2 line 43 of GB 866,082 disclose a method of producing a solid solution alloy of a solvent metal of the group consisting of silver, nickel, copper, and palladium, and solute metals of the group consisting of aluminum, beryllium, and magnesium in an amount varying from 0.1% to 5% by weight (which is equivalent to 0.4 – 17.4 at% Al and 0.4 – 19 at% Mg which overlap with the range recited in claim 12). The method comprises the step of heating the alloy in the presence of an oxygen-containing gas such as air under controlled

Art Unit: 4116

conditions of temperature to oxidize only the solute metal. The first example cited in GB 866,082 discloses that the range of temperature used to oxidize silver alloys is 1200°F – 1500°F (649°C – 816°C).^[el2] The oxidation of the solute metal occurs at a temperature between 649°C and 816°C which is within the range of 400 – 850°C recited in claim 12.

GB 866,082 differs from claims 12, 13, 22, and 23 in that it does not mention that the solute metal is soluble in silver or capable of forming a stable oxide at high temperature. However, it is well known in the art that aluminum, beryllium, and magnesium are all soluble in silver and capable of forming a stable oxide at high temperature. Also, GB 866,082 does not specifically teach the step of oxygenation or the separate steps of partial and complete oxidation, rather it only discloses one step of oxidation. Although GB 866,082 does not specifically teach the step of oxygenation at 300°C, one of ordinary skill in the art would know that oxygenation would occur during the time period that the initial alloy powder was heated to a temperature of 1200°F – 1500°F (649°C – 816°C). Also, it would have been obvious to one of ordinary skill in the art that above a certain temperature determined by routine experimentation the oxygen would dissolve into the silver contained in the initial alloy. Additionally, in the abstract Kuroishi et al. teaches a method of producing a silver-based alloy with the initial step of internal oxidation treatment at an initial temperature of 450°C – 700°C under a low pressure of atmospheric oxygen such as less than or equal to 5 atm and then raising the temperature or pressure from their initial values and repeating the oxidation at least one more time. It would have been obvious to one of ordinary skill in the art that during the first round of oxidation at 450°C – 700°C (partial oxidation) the solute metal would

Art Unit: 4116

form precipitate particles that prevent alloy grains from coarsening because it is not complete oxidation. Also, it would have been obvious to one of ordinary skill in the art that oxidation takes place in at least an outer layer of the alloy where the solute metal forms an oxide stable at high temperatures because the oxygen dissolves into the silver alloy beginning at the surface. One would have been motivated to modify GB 866,082 in view of Kuroishi et al. because it is well known in the art that by repeating internal oxidation at least two times the hardness distribution and heat resistance are considerably improved (see abstract of Kuroishi et al.).

Regarding claims 14 and 16, dependent on claim 12, and claims 15 and 17, dependent on claim 13, GB 866,082 in view of Kuroishi et al. disclose the limitations of claims 12 and 13 as discussed above. In p. 1 lines 37 – 63, GB 866,082 teaches that a silver-based alloy thin sheet (strip) or wire is subject to oxidation. As previously mentioned, it would have been obvious to modify GB 866,082 in view of Kuroishi et al. in order to have two steps of oxidation, one immediately following the other, which are equivalent to partial and complete oxidation and occur under a low pressure of atmospheric oxygen. Also, it would have been obvious to one of ordinary skill in the art that the silver-based alloy thin sheet or wire could either be used as the final form of the alloy or as an intermediate form used to make a different final form of the alloy. Additionally, it would have been obvious to one of ordinary skill in the art to carry out partial oxidation on the intermediate part and then make it into its final form before performing complete oxidation after routine experimentation to determine when in the process to form the final alloy product in order to achieve the greatest hardness.

In regards to claims 18 and 20, dependent on claim 12, and claims 19 and 21, dependent on claim 13, GB 866,082 in view of Kuroishi et al. disclose the limitations of claims 12 and 13 as discussed above. In p. 2 lines 16 – 43 and lines 77 – 84, GB 866,082 disclose the method wherein the initial alloy is in the form of a powder, where the powder undergoes oxygenation and oxidation steps and is then hot extruded and made into its final form. As discussed above, it would have been obvious to modify GB 866,082 in view of Kuroishi et al. in order to have two steps of oxidation, which are equivalent to partial and complete oxidation. It would have been obvious to one of ordinary skill in the art through routine optimization to test the method of compacting the powder followed by oxygenation, hot extruding the alloy to its final form and performing partial oxidation before performing complete oxidation or to split up the oxygenation and oxidation steps by performing oxygenation, then compacting the powder followed by hot extrusion and partial oxidation where the alloy is made into the final part, and finally performing complete oxidation. Also, it would have been obvious to one of ordinary skill in the art that when the powder is compacted it must maintain an open porosity over its entire thickness in order for oxygen to dissolve into the initial alloy.

Regarding claim 24, dependent on claim 14, claim 25, dependent on claim 16, claim 26, dependent on claim 18, and claim 27, dependent on claim 20, GB 866,082 in view of Kuroishi et al. disclose the limitations of claims 14, 16, 18, and 20 as discussed above. In p. 1 line 89 to p. 2 line 15, GB 866,082 teaches that oxidation is carried out in the presence of an oxygen-containing gas such as air under controlled conditions of temperature to oxidize only the solute metal, which is an oxidizing atmosphere.

Similarly, in the abstract Kuroishi et al. teach that both steps of oxidation are carried out in the presence of atmospheric oxygen at a specific temperature and pressure, which is also an oxidizing atmosphere.

Conclusion

11. No claim is allowed. All pending claims have been rejected.
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/551,995
Art Unit: 4116

Page 9

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